



Keynote Systems

Transaction Perspective Requirements Specification

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Product Requirements Specification

Transaction Perspective

Revision History

1.0 Overview

Transaction Perspective is a service which measures the performance of an e-commerce web site transaction from multiple locations around the world 24 hours per day. The service quantifies performance across time and geography from the end users perspective to help determine if users are getting adequate performance and help in debugging problems when they occur. Examples of common transactions are booking an airline reservation, executing a stock transaction, checking the balance in a bank account or purchasing a book or CD. Problems that can be detected include content problems, web server problems, backend system problems, backbone problems or network problems.

2.0 Product Name and Version Number

Transaction Perspective 1.0

3.0 Positioning

Transaction Perspective measures e-commerce transaction performance continuously from the end users perspective to help maintain maximum customer satisfaction.

4.0 Target Market

Customers of this service include web managers, content creators and engineers who create e-commerce web sites and applications. The financial services industry is particularly interested in transactions since they are all moving to provide their services online.

Potential users of Transaction Perspective include:

5.0 OEM or Channel Considerations

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There are no special considerations that need to be taken into account for the channel. The fact that the transaction agent will be used as a private agent sold by the channel is discussed in the private agent spec.

6.0 Internationalization

Since transaction agents need to send input to web servers it should be possible for them to enter text in other languages. Although supporting international web sites are not an initial requirement we should not do anything in the design of the transaction agent to preclude adding them later.

7.0 Pricing

Price

Costs

8.0 Competition

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9.0 Features and Functions

What is a Transaction

A transaction is distinguished from a page download by either interaction with the page or the use of SSL. The transaction agent is the only agent with SSL so any measurement that requires SSL is a transaction. Any download that requires the agent to send some information back to the web server is a transaction. As an example, if a search engine query can be done by specifying the query in the URL then that is not a transaction and can be done with the current agent. If however the query requires the agent to download a page, send back some values to fill in a form and then download the resulting page, it is a transaction.

Architecture

The transaction agent will consist of embedding the Microsoft web browser control, which is the core of IE, in an application written by Keynote. The Keynote application will drive the control as well as retrieve preference information from Keynote servers and report back measurements to Keynote.

The agent will also be written to use the web browser control as a black box. This means that certain input to the browser will be scripted and will not be able to react to changes in the page.

Input to Transactions

Input to transactions consist of forms that need to be filled in, buttons that need to be pushed, links that need to be followed, areas of the screen that need to be clicked on. In addition, all these actions need to be defined for each of the pages in the transaction that need to be handled.

(Note: What do you do if a transaction can produce different output? Should we read the pages that come back to see if we get the correct response?)

Types of logins

The different logins that need to be handled include: cookie, login specified in the URL, standard login, form with ID/Password and submit button.

Move Between Pages

How the transaction moves between pages must be part of the script language that is used to drive the transaction. Clicking on a link or submit button are obvious actions that move you to another page.

(Note: What about a timed refresh that moves you to another page?)

Forms are a crucial part of transactions. The variable names used in forms will be used by the scripts to identify what data to submit. This means that customers cannot change variable names in their forms without changing the Keynote script otherwise the transactions will fail. An example of a form from Expedia follows:

A scripting tool, transaction recorder, will be used to capture the inputs to forms and the mouse clicks. This tool can be used by the customer or Keynote Operations to create a script and submit it to Keynote. Once the script is submitted and confirmed by Keynote Operations it can be put into the Preferences database and measurements can begin.

Output to Database

Components – 2 levels

The most basic data that is reported to the database is the overall time it took to complete the transaction. There are two additional areas of detail that will be reported, components and errors.

There are two levels of components that can be reported:

Level 2 – This level is the most detailed and consists of the individual parts of a file download such as DNS, connection setup, time to first byte, etc.

Level 2 Components

DNS
Connection Setup
Time to first byte
Complete index.html
Page components (GIF, JPEG)
Complete full page download
Redirect time
Number of bytes downloaded
Error count

Level 1 – This level consists of the individual steps in the transaction. Typically this would be each page downloaded in a transaction. This level could also consist of steps that are completed by Java applets or Java scripts. Whether these intermediate times are reported depends on whether the web browser control reports their completion and whether there is customer demand for this level of detail. **(Note: further discussion needed)**

Level 1 Components for a 3 page transaction

Page 1 complete
Page 2 complete
Page 3 complete
Total Transaction Time

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Data Examples:

The following examples show what data would be collected for a 3 page transaction under different circumstances.

1. Successful Transaction

Standard Data

Component Errors	5
Round trip response time for transaction	27.8 secs.

Optional Data (this detail is only saved if the customer asks for it)

Component	Page 1	Page 2	Page 3
DNS	.7 secs	0 secs	0 secs
Connection Setup	.5 secs	.4 secs	.5 secs
Time to first byte	.5 secs	.6 secs	.6 secs
Complete index.html	2 secs	3 secs	4 secs
Page components (GIF, JPEG)	4 secs	3 secs	8 secs
Complete full page download	7.7 secs	7.0 secs	13.1 secs
Redirect time	0 secs	0 secs	0 secs
Number of bytes downloaded	10,321	9,121	12,512
Component Errors	0	4	1

2. Failed Transaction – page not found on the first page

Because the first page failed on the download of the index.html there is no useful data to report other than the fact that the page was not found.

Standard Data

Component Errors	0
Round trip response time for transaction	-404

(note the -404 rather than a round trip time)

Optional Data

Component	Page 1	Page 2	Page 3
DNS	0 secs	0 secs	0 secs
Connection Setup	0 secs	0 secs	0 secs
Time to first byte	0 secs	0 secs	0 secs
Complete index.html	0 secs	0 secs	0 secs
Page components (GIF, JPEG)	0 secs	0 secs	0 secs
Complete full page download	0 secs	0 secs	0 secs
Redirect time	0 secs	0 secs	0 secs
Number of bytes downloaded	0	0	0
Component Errors	0	0	0

3. Failed Transaction – 4 missing GIFs on second page

This transaction finished to completion even though some of the GIFs did not successfully download. Because the transaction did complete, a time was recorded along with the information that there were 4 component errors. The optional detail data also shows how long each page took to download.

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Standard Data

Component Errors	4
Round trip response time for transaction	27.8 secs.

Optional Data

Component	Page 1	Page 2	Page 3
DNS	.7 secs	0 secs	0 secs
Connection Setup	.5 secs	.4 secs	.5 secs
Time to first byte	.5 secs	.6 secs	.6 secs
Complete index.html	2 secs	3 secs	4 secs
Page components (GIF, JPEG)	4 secs	3 secs	8 secs
Complete full page download	7.7 secs	7.0 secs	13.1 secs
Redirect time	0 secs	0 secs	0 secs
Number of bytes downloaded	10,321	9,121	12,512
Component Errors	0	4	0

4. Failed Transaction – Second page fails to download

The transaction could not complete because one of the pages did not download. Without the second page the transaction could not continue so the result is an error code, not a time. Because the first page did download successfully the optional detail data shows the download time for the first page.

Standard Data

Component Errors	5
Round trip response time for transaction	-404

(note the -404 rather than a round trip time)

Optional Data

Component	Page 1	Page 2	Page 3
DNS	.7 secs	0 secs	0 secs
Connection Setup	.5 secs	.4 secs	0 secs
Time to first byte	.5 secs	.6 secs	0 secs
Complete index.html	2 secs	0 secs	0 secs
Page components (GIF, JPEG)	4 secs	0 secs	0 secs
Complete full page download	7.7 secs	0 secs	0 secs
Redirect time	0 secs	0 secs	0 secs
Number of bytes downloaded	10,321	9,121	0
Component Errors	0	4	0

Errors – An error can be reported for any component of any page. Errors include network errors such as DNS errors as well as HTTP errors such as “Page Not Found”. If an error occurs at any stage downloading the initial page then the whole transaction is aborted. An example of this would be a page timeout on the initial page making it impossible to proceed. This would result in an error code being reported for the whole transaction. If an individual element of a page such as a GIF gets an error then the error code and the file are noted but the transaction continues. An overall error count will be provided along with a delta time in cases where the transaction completed but multiple images did not download correctly. Optionally the customer can specify that if any error occurs for any part of the page that the whole transaction be reported as an error and no delta time would be reported.

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As an option, customers can have the list of GIFs or component URLs that failed. This data will be stored separately since it is debug information

If an intermediate step in the transaction fails such as a search engine query never returns from the request and gives a page timeout, there are two possible options, 1. Report the time and the error, 2. Don't report a time since the transaction did not complete and just report the error along with an indication of where the failure occurred. The customer has the option of which mode the agent will operate in for their URL. Intermediate failures can also occur in applets or Java scripts.

Restrictions

All input to applets and java script and all errors from applets and java script can only be handled to the extent that the Microsoft web browser component provides input and output to applets and scripts. External dialogs cannot be handled at this time either.

Frames

All pages within a frame are considered part of one page even though technically each frame is a dedicated HTML page.

Cache

The agent should not cache any files or DNS lookups between transactions. Each transaction should be done as if it is a first time user. During a single transaction, components such as GIFs and DNS lookups can be cached. (Note: This behavior may require changes to the web browser control)

SSL

The level of SSL support will depend completely on what is available in the web browser control from Microsoft.

Visualizing Data

All of the data and errors that are stored must be available via the FTP service, API and Web Edition. The data does not have to be visible through Professional Edition. How the data is displayed in Web Edition will be defined at a later date. The file component information such as GIFs that fail to download does not have to be made available through Web Edition. This error data could be made available through a different mechanism since it is debug information that is typically stored for a short period of time and is not graphed.

Alarms

Performance alarms just like the ones Keynote currently provides will be available. Performance alarms send an alert when overall download times degrade. Site down alarms would also be available whenever transactions completely fail from all agents over the course of an hour, the standard measurement interval.

10. Trade Offs and Alternatives that were considered

Two alternatives that were considered were building our own agent or using Netscape source code. Netscape source code was rejected because anytime there was a new Netscape release we would have to reintegrate our changes. Building our own agent was rejected because it means that we continually have to keep up on changes to HTML so our parser is correct and would not be able to download or execute applets or java script.

11. Performance Characteristics

Performance standards are based entirely on the ability to scale the agent. If measurements can only be taken one at a time then the agent performance is dictated by the speed of the Internet and how many pages it can download in a set period of time.

12. Scalability Issues

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The most important issue regarding scalability is that measurements do not affect each other. This is especially important for transactions because many use SSL which is processor intensive. We need to be sure that if two measurements are being taken and one uses SSL that its use of the processor does not affect the other measurement by blocking its use of the processor while it is in the middle of taking a measurement. The second issue is that if multiple measurements are taken at once we need to be sure that every part of the agent is multi-thread safe. In the worst case the agent will not be able to do more than one measurement at a time in which case the number of measurements it can take in an hour is:

$(60 \text{ sec} * 60 \text{ min}) / \text{average transaction time}$

If an average transaction is 2 pages and each page takes about 5 seconds then you can do 360 transactions per hour.

If the agent can be built in a way to use multiple processors to run multiple instances of the agent so that they don't interfere with each other then that technique could be used to increase scalability.

13. Manageability

All of the manageability features in the current NT agent will need to be put into the transaction agent. In addition the transaction agent will also be used as a private agent so there are some additional features that it requires, see the private agent spec for details.

14. Future Enhancements

To Be Decided.

15. Incremental Costs

The transaction agent will be run on separate hardware from the current agent so an additional PC running NT will need to be put in each location where we have an agent. The separate PC is needed so that transactions that use SSL will not affect measurements being taken by the standard agent.

From: owner-customers@keynote.com on behalf of Fritz Mueller [fmueller@keynote.com]

Sent:

To: customers@keynote.com

Subject: New Keynote Services

Dear Keynote Customer,

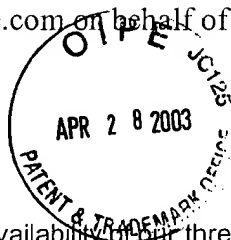


EXHIBIT B

We are pleased to inform you of the availability of three new services, Keynote Perspective Secure Page Service, Secure Page Login Service and Transaction Service. The Secure Page service supports the industry-standard HTTPS security protocol, which is used in nearly all e-commerce transactions on the World Wide Web and provides secure, encrypted connections to web pages containing private information such as passwords or credit-card numbers. The Secure Page service is available immediately on a subscription basis to e-commerce companies to assure and improve the quality of service of the secure areas of their web sites, which may perform differently than unsecured areas over time, user geography and Internet backbone. The Secure Page Login service provides the same measurement service for an interactive login page on any e-commerce site.

The Transaction service measures the performance and availability of multi-page interactive transactions on e-commerce web sites as experienced by users in major cities around the world. The Transaction service employs a unique browser-based recorder that is first used to record and play back a transaction sequence at a desktop PC without requiring any complicated scripting language or technical expertise. The recorder captures the exact sequence of web pages, form fields, and hyperlinks that an online user navigates in performing an interactive transaction on a web site. The recorded transaction is then distributed to Keynote's measurement computers around the world where it is executed around the clock at the desired intervals in order to collect detailed measurement data about each step of the transaction.

All services are available immediately and part of our continuing effort to provide the best e-commerce quality of service measurements possible. Secure Page prices are based on the selected geographic coverage of measurement locations and begin at \$295 per month per URL or Login for hourly measurements from each of the top 10 U.S. metro areas. Transaction prices start at \$995 for a 5 page transaction from the top 10 U.S. metro areas. Please contact your Keynote sales representative, sales@keynote.com, or visit our web site, <http://www.keynote.com>, for more information.

Thanks for your support.

Sincerely,
Fritz Mueller
Director, Product Marketing
Keynote Systems

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